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PEDAGOGICAL MECHANISMS FOR DEVELOPING PROJECT MANAGEMENT SKILLS AMONG HIGHER PEDAGOGICAL EDUCATION STUDENTS

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Abstract

Although students in higher pedagogical education acquire theoretical knowledge, they do not demonstrate an equivalent level of proficiency in planning educational and developmental tasks as projects, coordinating resources, and evaluating outcomes. This discrepancy necessitates a systematic substantiation of pedagogical mechanisms designed to foster project management skills. The objective of this study was to define the content and operational conditions of an integrative model aimed at developing these skills among students in higher pedagogical education. Following a comparative analysis of theoretical sources, a diagnostic model was tested through a three-stage pedagogical experiment: a baseline assessment, a formative intervention, and a final evaluation. During the experiment, project-based assignments, reflective discussions, the allocation of team roles, and iterative feedback were employed as a unified didactic framework.

Keywords: team collaboration, project-based activity, reliability of measurement instruments, pedagogical support, pedagogical experiment, reflective analysis, professional preparation of students

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OLIY PEDAGOGIK TA’LIM TALABALARIDA LOYIHA BOSHQARUVI KO‘NIKMALARINI SHAKLLANTIRISHNING PEDAGOGIK MEXANIZMLARI

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Annotatsiya
Oliy pedagogik ta’lim jarayonida talabalar nazariy bilimlarni egallagan bo‘lsalarda, o‘quv-tarbiyaviy vazifalarni loyiha sifatida rejalashtirish, resurslarni muvofiqlashtirish va natijani baholash ko‘nikmalarini bir xil darajada namoyon eta olmaydi. Mazkur ziddiyat loyiha boshqaruvi ko‘nikmalarini shakllantirishga xizmat qiladigan pedagogik mexanizmlarni tizimli asoslash zaruratini yuzaga keltiradi. Tadqiqotning maqsadi oliy pedagogik ta’lim talabalarida ushbu ko‘nikmalarni rivojlantirishga yo‘naltirilgan integrativ modelning mazmuni va amal qilish shartlarini aniqlashdan iborat bo‘ldi. Nazariy manbalar qiyosiy tahlil qilindi, so‘ng uch bosqichli pedagogik tajriba — aniqlovchi kirish testi, shakllantiruvchi intervensiya va nazorat chiqish testi — asosida diagnostik model sinovdan o‘tkazildi. Tajriba jarayonida loyiha topshiriqlari, refleksiv muhokama, jamoaviy rollar taqsimoti va bosqichma-bosqich teskari aloqa yagona didaktik majmua sifatida qo‘llandi.

Kalit so‘zlar: jamoaviy hamkorlik, loyihaviy faoliyat, o‘lchov vositasi ishonchliligi, pedagogik qo‘llab-quvvatlash, pedagogik tajriba, refleksiv tahlil, talabalarning kasbiy tayyorgarligi.

INTRODUCTION

The inadequate development of design skills limits the independent activity of students in higher pedagogical education within the teaching and educational process. The project-based method integrates collaboration, planning, and reflection [1]. It has been noted that the outcomes of project-based activities in

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higher education depend on the alignment between assessment tools and pedagogical mechanisms [2]. Existing research has not sufficiently analyzed an integrative model—comprising a competency-based approach, step-by-step reflection, and systematic feedback—specifically within the context of pedagogical experimentation [3].

This study examines the process of developing design competencies among students in higher pedagogical education, focusing on the content, sequence, and methodological effectiveness of pedagogical mechanisms. The objective was to determine the impact of the following mechanisms: 1) the development of a competency matrix; 2) the establishment of rubric criteria; and 3) the application of a non-equivalent control group design.

The primary hypothesis posited that the integration of project-based activities, reflection, team collaboration, and feedback would lead to an improvement in project management skills, as evidenced by pre-test and post-test results. The novelty of the study lies in the substantiation of an integrative model of pedagogical mechanisms, which was tested through a three-stage pedagogical experiment. This approach enriches the theory of a developmental environment and differentiated instruction; the findings can serve as a diagnostic tool for higher education methodologists. This theoretical perspective was refined through a comparative analysis of the literature.

LITERATURE REVIEW

The theoretical frameworks outlined in the introduction necessitate a reinterpretation of the mechanisms for developing project management skills—viewing them, specifically, as distinct pedagogical conditions. Markham links the project-based method with problem-based learning, coaching, and iterative reflection [4]. Meanwhile, Larmer, Mergendoller, and Boss integrate educational objectives, the quality of the final product, and collective responsibility into a unified didactic principle [5]. While these approaches posit that project management skills are developed through active engagement rather than merely through theoretical knowledge, the diagnostic criteria for students in higher pedagogical education remain insufficiently defined. Blumenfeld, Soloway, Marx, Krajcik, Guzdial, and Palincsar—addressing how to motivate students to

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engage in project-based learning and how to provide support throughout the educational process—emphasize the necessity of harmonizing the motivational and cognitive aspects of project-based activity [6]. Thomas synthesizes research on project-based learning and systematizes the theoretical and practical foundations of this approach [7].

Bender suggests adapting project assignments to students' levels of preparation through differentiation and individualization in education [8]. Krajcik and Blumenfeld provide a theoretical basis for a developmental environment and pedagogical feedback as essential, consistent components of project-based activity [9]. While these perspectives strengthen the competency-based approach, specific components of project management skills—such as time planning, task allocation, and risk assessment—have not been systematically examined within a unified pedagogical context. Condliffe, Quint, Visher, Bangser, Drohojowska, Saco, and Nelson review the literature on project-based learning, synthesizing scholarly perspectives on the application and research of this approach within the educational process [10].

Table 1. Approaches to developing project management skills

Approach	Core mechanism	Unspecified aspect
Project-based method	Collective product	Individual diagnosis
Reflective approach	Feedback	Cross-stage criterion

As shown in Table 1, existing approaches address the organization of activities but do not measure the interplay between pedagogical mechanisms. Kirillova links project-based activities in higher education to professional training [11], while Monaxov establishes a systematic basis for designing pedagogical objects [12]. Polat describes the project method as a tool for organizing education within the framework of modern pedagogical and information technologies [13]. Consequently, in pedagogical practice, it is necessary to examine the combination of pre- and post-testing, observation, and reflection as a distinct methodological solution. Addressing this gap requires a diagnostic model based on a comparison between an experimental group and a control group.

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RESEARCH MATERIALS AND METHODS

In this study, students in higher pedagogical education were divided into an experimental group and a control group; their project management skills were assessed using questionnaires, observation sheets, and practical assignments. The questionnaire covered indicators such as planning, teamwork, time management, and reflective monitoring. A competency matrix linked the components of project management to specific assessment criteria, while a rubric defined low, medium, and high proficiency levels. Approval from the local ethics committee, permission from the institution's administration, written consent from a legal representative (in the case of minors), and the student's verbal consent were obtained.

Table 2. Measurement instruments and methodological tasks

Instrument	Measurable dimension	Assessment format
Questionnaire	Planning and time management	Score
Observation sheet	Collaboration and reflection	Level
Practical task	Project management integration	Rubric

Table 2 illustrates the functional distribution of the instruments used. An entry test was administered during the diagnostic phase; project-based activities, ongoing reflection, and systematic feedback were employed during the formative phase; and an exit test was conducted during the assessment phase. Statistical analysis was performed using the SPSS software, with differences between groups evaluated via independent t-tests, one-way ANOVA, Tukey's HSD, and Cohen's d. This sequence facilitated a consistent interpretation of the dynamics of change in pedagogical mechanisms within the results section.

RESULTS

Based on a diagnostic model grounded in a literature review, the results from the entry and exit tests revealed shifts in project management skills across the groups.

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In the pedagogical experiment, the composition of the experimental and control groups was balanced; the distribution of respondents is presented in Table 3.

Table 3. Compositional distribution of participants in the pedagogical experiment

Indicator	Experimental group, N	Experimental group,%	Control group,N	Control group,%
Total	64	50,4	63	49,6
Female students	41	64,1	39	61,9
Male students	23	35,9	24	38,1
First year	35	54,7	33	52,4

The distribution in Table 3 demonstrates that the groups were comparable in terms of gender and educational level at the start of the experiment. The internal consistency of the diagnostic toolkit—comprising a questionnaire based on a competency-based approach, an observation sheet, and practical project assignments—yielded a Cronbach's alpha coefficient of $\alpha = 0.78$. In the pre-test, the experimental group scored 41.6 ± 6.2, while the control group scored 41.1 ± 6.0; the Student's t-test for independent samples resulted in $t(94) = 0.40$, $p = 0.691$, confirming initial equivalence between the groups.

Table 4. Statistics for pre-test and post-test regarding project management skills

Indicator	Control Group (M±SD)	Experimental group (M±SD)	t	p
Entry test, score	41,1±6,0	41,6±6,2	0,40	0,691
Exit test, score	47,0±6,4	58,9±5,7	9,42	<0,001
Speed, minutes	18,6±3,1	15,2±2,6	5,78	<0,001
Success rate, percent	58,8±8,7	73,6±7,9	8,61	<0,001

Source: author's calculations

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The one-way analysis of variance (ANOVA) of the post-test results indicated that the difference between the groups was statistically significant; this difference was associated with a higher mean score for the experimental group. In addition to confirming the overall statistical significance of the differences between the groups, the ANOVA results reinforced the superior outcome of the experimental intervention as measured by the post-test. Pairwise comparisons using the Tukey HSD test further confirmed this pattern, showing a significant difference between the experimental and control groups that favored the experimental group.

$$d = \frac{\bar{X}_{experience} - \bar{X}_{control}}{s_{combined}} \quad (2)$$

here $\bar{X}$exp. — experimental group mean; $\bar{X}$control — control group mean; scombined — pooled standard deviation across groups.

This quantitative shift was observed alongside a developmental environment that integrated the project-based method, step-by-step reflection, collaborative teamwork, and systematic feedback. Bell noted that project-based activities enhance collaboration and planning skills [1]. The subsequent discussion explores the implications of these differences in relation to pedagogical mechanisms.

DISCUSSION

The intergroup difference between the pre-test and post-test results suggests that integrative pedagogical mechanisms are more effective in developing project management skills. The disparity between the experimental group and the control group can be attributed to the combined impact of the project-based method, step-by-step reflection, and systematic feedback. Bell described project-based learning as an environment that fosters collaboration, planning, and problem-solving skills [1]. This interpretation aligns with the outcomes observed in the developmental environment of this pedagogical experiment.

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Table 5. Pedagogical content of project management skill components

Component	Pedagogical mechanism	Cohen d
Planning	Problem-based teaching and individualization	1,92
Collaboration	Developmental education and differentiation in instruction	1,47
Reflection	Systematic feedback and pedagogical diagnosis	1,31

Figure 2 shows the overall picture of the results obtained.

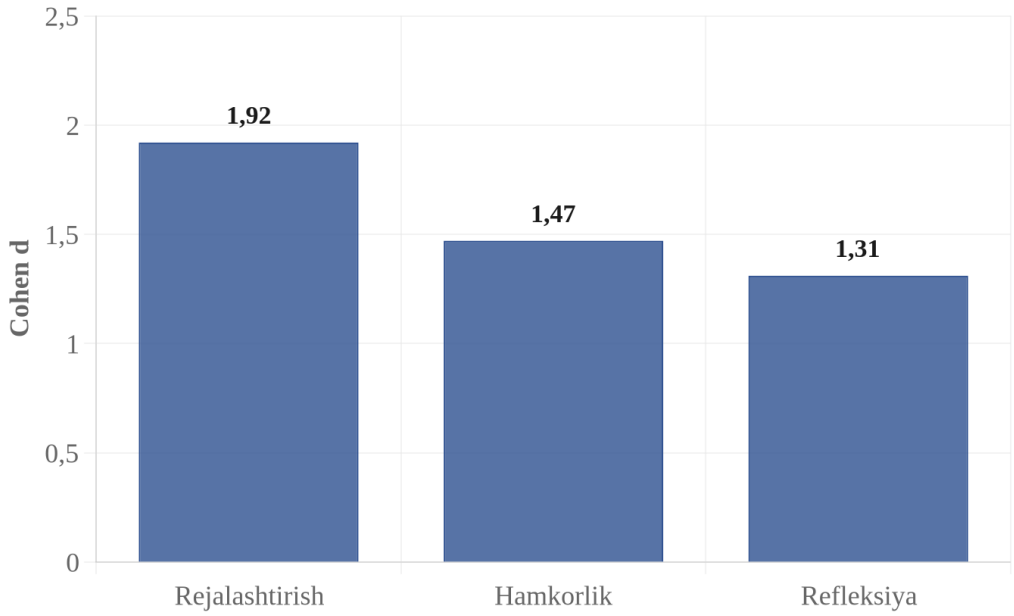


Figure 2. Diagram of the pedagogical content of project management skill components.

The alignment of components shown in Table 5 supports the conclusions of Guo et al. regarding the necessity of jointly evaluating both the process and the product in higher education projects [2]. Kokotsaki et al. noted that the effectiveness of project-based activities depends on clear guidance and support from the instructor [14]. This finding indicates that, within a competency-based approach, student autonomy should not be left unmonitored; rather, it must be guided through the use of rubrics and feedback. The concept for the development of higher education

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in Uzbekistan also links project-based pedagogical innovations with professional training [15]. The study's limitations include its focus on a single educational institution, a relatively short pedagogical experiment, and the inclusion of self-assessment elements. Future research—incorporating multiple institutions, long-term observation, and subject-specific didactics—will provide deeper insight into the robustness of these mechanisms.

CONCLUSION AND RECOMMENDATIONS

The differences observed between pre-test and post-test results confirm the combined impact of project-based activities, reflection, teamwork, and systematic feedback on the development of project management skills. The hypothesis proposed within the non-equivalent control group design was supported by the results of the pedagogical experiment.

For the first time, a three-stage, interconnected model of pedagogical mechanisms for students in higher pedagogical education has been substantiated, integrating a competency-based approach, the project method, and a developmental environment. This model interprets project management skills not as a separate task, but as an integrative outcome of the educational and developmental process.

Educators in higher education institutions should systematically incorporate formative interventions into educational projects and conduct pedagogical diagnostics using pre-tests and post-tests. It is advisable to utilize measurement instruments—validated with a Cronbach's alpha coefficient of ≥0.70—within a framework of educational differentiation and individualization. Future research should examine the stability of this model across various specializations and within the context of long-term pedagogical observation.

References:

1. Bell S. Project-Based Learning for the 21st Century: Skills for the Future // The Clearing House: A Journal of Educational Strategies, Issues and Ideas. — 2010. — Vol. 83. — № 2. — P. 39–43. — DOI: 10.1080/00098650903505415.
2. Guo P., Saab N., Post L.S., Admiraal W. A Review of Project-Based Learning in Higher Education: Student Outcomes and Measures // International Journal of

Modern American Journal of Linguistics, Education, and Pedagogy
ISSN (E): 3067-7874
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Website: usajournals.org
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Educational Research. — 2020. — Vol. 102. — Article 101586. — DOI: 10.1016/j.ijer.2020.101586.
3. Larmer J., Mergendoller J.R., Boss S. Setting the Standard for Project Based Learning: A Proven Approach to Rigorous Classroom Instruction. — Alexandria: ASCD, 2015. — 192 p.
4. Krajcik J.S., Blumenfeld P.C. Project-Based Learning // The Cambridge Handbook of the Learning Sciences / ed. R.K. Sawyer. — Cambridge: Cambridge University Press, 2006. — P. 317–334. — DOI: 10.1017/CBO9780511816833.020.
5. Thomas J.W. A Review of Research on Project-Based Learning. — San Rafael: Autodesk Foundation, 2000. — 94 p.
6. Bender W.N. Project-Based Learning: Differentiating Instruction for the 21st Century. — Thousand Oaks: Corwin, 2012. — 184 p.
7. Кириллова Г.А. Проектная деятельность студентов в образовательном процессе вуза // Высшее образование в России. — 2018. — Т. 27. — № 10. — С. 117–125.
8. Монахов В.М. Технология проектирования педагогических объектов // Педагогика. — 2001. — № 5. — С. 16–22.
9. Полат Е.С. Метод проектов // Современные педагогические и информационные технологии в системе образования: учебное пособие. — Москва: Академия, 2007. — 368 с.
10. Kokotsaki D., Menzies V., Wiggins A. Project-Based Learning: A Review of the Literature // Improving Schools. — 2016. — Vol. 19. — № 3. — P. 267–277. — DOI: 10.1177/1365480216659733.
11. O‘zbekiston Respublikasi Prezidenti. O‘zbekiston Respublikasi oliy ta’lim tizimini 2030-yilgacha rivojlantirish konsepsiyasini tasdiqlash to‘g‘risida: PF-5847-son Farmon. — Toshkent, 2019. — 24 b.